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lithographs, in three colors, of typical localities within the United States. Such charts as are used to illustrate weather conditions are well selected. Nearly every phase of the subject has its appropriate figure or map to aid the student in gaining a correct idea of the matter in hand.

Exercises.—One of the most important features of the book is the portion devoted to original exercises at the end of each chapter. By the use of these exercises the student is induced to think for himself and apply what is discussed in the text. As far as is practicable the student is led up into the subject rather than led down out of it. Numerous well selected references are given. These serve a double purpose. Not only do they place the student in touch with more important publications bearing on the subject but they also furnish a list of books which might well be placed in every school library for the use of science teachers. It is a gratification to have such a text-book to work with and it will be appreciated by every teacher of physiography.

GEORGE BURBANK SHATTUCK

SOCIETIES AND ACADEMIES

THE NEW YORK ACADEMY OF SCIENCES—SECTION OF GEOLOGY AND MINERALOGY

At the first regular meeting, October 7, 1907, the following papers were read:

On the Pebbles at Harwich (Cape Cod), Mass., and on Rude Arrow-heads found among them: Dr. ALEXIS A. JULIEN.

Along the south shore of the apron-plain at Harwich the glacial deposits show abundant sections of layers of gravel, often coarse, and at one point huge angular boulders, up to eight feet in diameter, similar to those in the moraine along the north side of the cape. The pebbles consist almost altogether of crystalline rocks in considerable variety, in which, however, three types predominate. The principal one is a coarse binary granite, sometimes porphyroidal, passing by addition of hornblende into monzonite. Its sheared form seems to be represented by pebbles of granite-

gneiss or aplite-schist, without mica, and very rarely of a fine biotite gneiss.

This rock appears to have been cut by intrusive dikes, both of an acid rock and of another of intermediate character, occurring in abundant pebbles. The one is a pinkish quartz-porphry, a white felsite or finely striped rhyolite, whose sheared form appears to be a white phyllitic gneiss, with minute augen-structure. The other, a rather finely granular gabbro, made up of white feldspar and a greenish black hornblende-like mineral. This rock by shearing has passed into a hard greenstone, often decidedly schistose, and perhaps into a banded schist. Besides these three types, several varieties of fine crystalline schists, probably metamorphic; rarely small grains of serpentine; and occasional flakes of blue-black argillite. A marked feature in all these rocks is the almost entire absence of mica of any kind and that mineral does not occur even in the sands and clays, at least in scales visible to the naked eye.

By contrast, the characteristic rocks of the adjoining coast along the mainland of eastern New England have not been found, in spite of constant search, *e. g.*, the mica-gneisses and mica-pegmatites north of New Bedford, the granite of Quincy, Mass., the Dorchester conglomerate, the pyroxenic rocks and basic mica-diorites of Nahant, the porphyritic biotite granites of the Maine coast, etc. The conclusion is that the pebbles at Harwich have been transported from some other mica-less region.

Among the pebbles in ploughed fields many rude stone implements may be found, such as tomahawks, scrapers, lance-heads, and particularly arrowheads of the simplest form, probably left by Indians of the Massaquoit tribe, of whom several small kitchen-middens have been found in the neighborhood. These tools have been made from the local materials above described, chiefly from pebbles of the harder and finer schists, rhyolite, quartz-porphry and often granite. Their dull edges and rounded points may imply that in many cases they have never been sharpened, but used for stunning birds and small animals. Many

show mere traces of human workmanship, perhaps but one or two artificial faces, as if their owners had been content to use the simplest flakes for arrow-points.

The Sylvania Sandstone—A Study in Paleogeography: Dr. A. W. GRABAU.

The speaker described field work carried on in company with Professor Sherzer in southern Michigan for the state survey. The special object of study was the Upper Monroe formation and the Sylvania sandstone. The evidences of the eolian (anemoclastic) origin of this rock were presented. An interesting new fauna of late Siluric age and with Devonian affinities was found in the higher beds. Evidence of the disconformable relation of the Monroe and the overlying Dundee (Onondaga) was obtained.

After discussion of both papers, the members of the section contributed observations made during the summer. Professor J. F. Kemp stated the general results of study of the petrography of the Adirondack region, and Dr. E. O. Hovey gave an account of excursions of Section E of the American Association for the Advancement of Science in the vicinity of the Adirondacks. Professor C. P. Berkey reviewed his recent investigations in the Highlands of New York, the difficulty of correlation of the Manhattan schists on the south with the Cambrian sedimentaries on the north, but reported the passage of the latter into crystalline condition eastward toward the Connecticut line.

ALEXIS A. JULIEN,
Secretary

THE AMERICAN MATHEMATICAL SOCIETY

THE one hundred and thirty-fifth regular meeting of the society was held at Columbia University on Saturday, October 26, a single morning session sufficing for the usually brief program. The attendance included twenty-eight members. Vice-president P. F. Smith occupied the chair. The council announced the election of the following persons to membership in the society: V. R. Aiyar, Gooty, India; P. P. Boyd, Hanover College; Charles Haseman, Indiana University; C. A. Proctor,

Dartmouth College; I. M. Rysgaard, University of North Dakota; C. A. Toussaint, New York City College. Thirteen applications for membership were received. A list of nominations of officers and other members of the council was adopted to be placed on the ballot for the annual meeting.

The following papers were read:

R. D. CARMICHAEL: "A certain class of quartic curves."

R. D. CARMICHAEL: "Geometric properties of quartic curves possessing fourfold symmetry with respect to a point."

OSWALD VEULEN: "On magic squares."

L. E. DICKSON: "On triple algebras and ternary cubic forms."

G. H. DARWIN: "Further note on Maclaurin's spheroid."

J. T. COOLIDGE: "The equiangular transformations of space."

EDWARD KASNER: "Note on isothermal systems."

R. L. MOORE: "A note concerning Veblen's axioms for geometry."

JOSEPH BOWDEN: "Proof of a formula in combinations."

The annual meeting of the society, at which the annual election of officers takes place, will be held at Columbia University on Friday and Saturday, December 27-28. The Chicago Section will meet on December 30-31, in affiliation with the American Association for the Advancement of Science. The annual meeting of the Southwestern Section was held at St. Louis on November 30.

F. N. COLE,
Secretary

THE ANTHROPOLOGICAL SOCIETY OF WASHINGTON

THERE was presented at the meeting of November 5, 1907, a report on "Recent Explorations and Excavations in Colorado, Utah and New Mexico," by Edgar L. Hewett, director of American archeology for the Archeological Institute of America. The paper was illustrated with lantern slides. Professor Hewett was able, with the aid of volunteer students, to carry on an extensive reconnaissance of ruins on the San Juan River in Utah and Colorado, and interesting views were

shown of this work in Mesa Verde Park, McElmo Canyon, Monument Park and Grand Gulch, the latter containing several hundred cliff-dwellings of the "Basket Makers." The work in New Mexico was concentrated on a large ruin in the Puye, where 120 rooms were cleared out and a collection secured numbering 3,500 artifacts. The paper was discussed by the president, Dr. Hrdlicka, and Mr. Robinson.

WALTER HOUGH,
General Secretary

THE CHEMICAL SOCIETY OF WASHINGTON

THE 177th regular meeting of the Chemical Society (Washington Section) convened at the Cosmos Club, November 14, at 8 P.M., President Fireman presiding. Two councilors, L. M. Tolman and F. K. Cameron, were elected to represent the section at the general meeting of the society.

The following paper by C. A. Crampton and L. M. Tolman, "The Changes taking Place in Whiskey during Storage in Wood," was read by Mr. Tolman. Graphic illustrations showed the chemical changes in whiskey during nine years' study. The attendance was about eighty.

J. A. LECLERC,
Secretary

DISCUSSION AND CORRESPONDENCE

THE HOLOTHURIAN IN DREW'S INVERTEBRATE ZOOLOGY

THE laboratory guide written by Dr. Gilman A. Drew with the aid of members of the zoological staff of instructors of the Marine Biological Laboratory at Woods Holl, like its predecessor by Dr. Bumpus, has many excellent features. Since it is probable that a number of teachers will place this work in the hands of their students before a new edition can be issued, I venture to make a few suggestions concerning the description of *Thyone*, the type representing the Holothuriidea.

On page 69 the paragraph numbered 2 relates that "Ten forwardly directed canals leave the water-ring and pass into the tentacles." Some of the older text-books affirm this error, while others do not state clearly the origin of the tentacles but most of the newer

works on zoology like Parker and Haswell, Delage and Hérouard, Goodrich in Lankester, Lang and others properly describe the tentacular canals arising from the *radial canals*. Ludwig, in 1891, demonstrated in the embryology of *Cucumaria planci* that the tentacles arise from the radial canals and not, as previously given, from the circular canal (water-ring). The student should be directed to inject the water vascular system with Ranvier's Prussian blue through one of the Polian vesicles. After cutting away the oesophageal wall he can see the tentacular canals branching from the radial canals just before the latter bend over the radial pieces of the calcareous ring. He will thus understand that the tentacles are simply modified pedicels.

Since in the study of holothurians it is important to distinguish the ambulacral appendages with suckers, as *pedicels*, from those without, as *papillæ*, it would be better, on page 67, to substitute *cylindrical pedicels* for "papilliform ambulacral suckers." The term sucker could then be limited to the terminal sucking disc.

Under Digestive System (p. 68) the *calcareous ring* should be substituted for "a cartilaginous structure."

Under Reproductive System (p. 68) the gonad should be described as made up of two brushes, one on either side of the dorsal mesentery.

It is to be regretted that no mention is made of the paired bands of longitudinal muscles, so characteristic of holothurians, and of the five powerful retractor muscles possessed by *Thyone* and the other members of the family Cucumariidæ. For comparison with the skeleton of the other Echinoderma described by Drew something should be said of the spicules, in the form of *tables*, found in the walls of the pedicels of *Thyone*. The student can easily examine these spicules under the microscope after placing a few pedicels in caustic potash for a short time.

CHARLES L. EDWARDS

THE "CENSUS OF FOUR SQUARE FEET"

CONCERNING Nathan Banks's recent notice¹
¹ SCIENCE, N. S., XXVI., p. 637.